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ABSTRACT

Because poor "reading ability" is very often a primary obstacle in the learning process, an attempt was made to determine if the first grade child develops some knowledge structure by means other than reading. Instruction in each of six first grade classrooms was in the form of 18 audio-tutorial lessons, each taped to last about 15 minutes and involving the child with worksheets and many manipulative materials in which no reading was required. The "cloze procedure" technique was used as a means for measuring readability of both general and specific comprehension of textual materials used. The science concept test was scored by judging each of the child's verbal answers as correct or incorrect. The sight recognition test was scored by counting the number of words said correctly. The Spearman rank correlation coefficient was used for correlations made. High correlations were found between degree of concept attainment and verbal predictive ability in those concepts. Low correlations were noticed between reading ability and degree of concept attainment or verbal predictive ability. (EB)

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The Relationship Between Concept Attainment And Verbal Predictive Ability For Primary Grade Children

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Organizer:

This study investigated the relationship between 1) a primary grade child's knowledge of certain science concepts, 2) his verbal predictive ability (a type of reading task) in those conceptual areas, and 3) his general reading ability. After instruction employing a sequence of audio-tutorial lessons, a high correlation was found between the child's degree of concept attainment and the child's verbal predictive ability in those concepts. But very low correlations were noticed between general reading ability and the degree of concept attainment or the verbal predictive ability.

Background:

The primary school teacher considers that his or her most important responsibility is to teach reading. A great variety of methods are employed and a glut of software materials are available. As in most areas of instruction techniques come and go and are often recycled under different titles. Currently the teaching of reading in content areas and the renouncement of the primers are in. But what obstacles are there to the success of using content books to teach reading? Are not most primary grade science texts often too difficult for all but the best readers? How then can teaching a "poor reader" to read in a content area be facilitated?

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Reading is not a singular cognitive act. There are surely many and varied skills involved. Syntactic and semantic "rules", perceptual-motor "skills", and variables in the affective domain are interrelated in the process of reading. The act of predicting may be an important part of reading. Syntactic and semantic rules constitute an information processing structure which allow for prediction. The learning that occurs from previous experiences influences the learner's reaction to future stimuli. When a situation (set of stimuli) is noticed to be similar to some which have previously occured, the learner may be more accurate in a prediction of the outcome of that situation than when the original situation occured. If a reader was presented with the sentence "Spot chased the clon." and was asked to predict what word clon represented, syntactic rules would suggest that clon was most probably an "object-type" word, i.e. a noun. Also, if the reader knew that Spot was a small dog and also knew the types of objects which dogs chase, then the universe of possible alternatives would be sharply reduced. If a picture accompanied the sentence then a correct prediction would be highly probable.

The narrative-type books through which many children are given reading instruction employ the picture cues and operate in a cognitive area in which all children are competent , i.e. dogs chasing balls. New ideas are not presented to the child through this reading, but conversely the reading takes advantage of the information which the child already has. In those instances when the reading does expand into areas in which the children have little knowledge (new content areas) many children perform very poorly. This difficulty then often prompts the teacher to abandon the attempt to teach reading through the content books. What these children may need to successfully perform those reading tasks is more knowledge in

the content areas to which those reading tasks are related.

The first problem here is to develop efficient instructional systems through which the children can gain more knowledge without having to gain it initially through reading. The second problem is to determine the influence of the degree of concept attainment on the child's ability to perform reading tasks related in content to those concepts.

Methods:

Instruction was in the form of a sequence of 18 audio-tutorial lessons. Each taped lesson lasted about 15 minutes and involved the child with worksheets and many manipulative materials but no reading was required. A learning carrel was placed in each room and each lesson in turn was placed there by the teacher for approximately five school days. Each child took one or more individual turns. (This program is described by Novak in a book entitled The Audio-Tutorial Approach To Learning, Posthethwait, Novak, and Murray, 1972) The content of these lessons included the following:

1. electric energy can come from a battery
2. electric energy can change to light energy, heat energy, or movement energy
3. the more electric energy there is the more of one of the other forms of energy there can be
4. seed germination and plant growth involve a regularly occuring sequence of events
5. plants need energy to grow and that energy comes from the sun
6. plants have parts that have certain functions, i.e. the roots get water for the plant -- the roots do not get "food" for the plant

A technique called the "cloze procedure" introduced by Taylor (1953, 1957) as a means for measuring readability and both general and specific comprehension of textual materials was used in this study. A cloze test is constructed by mechanically and objectively deleting whole words and administered by having the subject guess at

at each blank space the word that has been deleted. Rankin (1959) describes the cloze procedure as an objective measure of language correspondance between reader and writer. Neie (1972) suggests that this procedure becomes a verbal index of the subject's ability to predict or anticipate, the communication he is receiving. This ability is referred to by Neie as "verbal predictive ability."

In this study a short sentence was constructed for each of the six principles previously stated. A noun or action verb was deleted and its posistion was marked by a line ten typewriter spaces long. Two forms of the cloze procedure were employed. In the first form three words were listed in a column above the blank. The sentence was read to the child except for the three word choices. The child was asked to pick (point to) to word in that column that would best complete the sentence. These sentences and the word choices are listed in Appendix I. In the second form, given to another group of children, the same sentences were again read but no alternatives were supplied. The child was asked to say (guess) the word which would best complete the sentence. A third task, given to still another group, involved listing seperately on index cards all words which were used as alternatives in the first form of the cloze test. The cards were randomly arranged and shown one at a time to the child who was asked to say the word.

The children in each of six first grade class rooms were ranked according to their general reading ability. The rank order in each class was divided into thirds and each third was randomly divided into thirds. Three composite groups were formed from children from each of the reading ability groupings from each room. Table 1 shows the treatments given to each group.

Table 1. Observations made on three groups of first graders after they had recieved a sequence of 18 audio-tutorial science lessons.

Group	Science Concept Attainment Test	Cloze Test		Sight Recognition Vocabulary Test
		with word choices	without word choices	
A n=54	X	X		
B n=53	X		X	
C n=46	X			X

Table 2. Spearman Rank Correlation Coefficient, r_s. (Siegel, 1957). Correlation between degree of concept attainment and scores made on various reading tasks.

	1.	2.	3.	4.	5.
1. Science Concept Test (Degree of Concept Attainment)	1.00	0.656*	0.803*	0.251	0.056
2. Cloze Test with word choices		1.00	---	---	0.153
3. Cloze Test without word choices			1.00	---	0.109
4. Sight Recognition of science words used in Cloze test				1.00	0.873*
5. General Reading Ability					1.00

* Significant at the 0.01 level, one-tailed test

The science concept test was scored by judging each of the child's verbal answers as correct or incorrect. The two forms of the cloze test were scored by counting the number of words which were picked or said correctly. In the form of the cloze test in which no choices were shown, some synonyms or other forms of the word were accepted. The sight recognition test was scored by counting the number of words said correctly. Some mispronunciations were accepted. The Spearman rank correlation coefficient, r_s, (Siegel, 1956) was employed for the correlations made.

Results and Discussion:

Table 2 shows the correlations made. Large and significant correlations were found between the degree of science concept attainment and scores made on the two forms of the cloze test. The children who knew most about the science concepts were more likely to guess what word should go in the blank when no choices were supplied and when the three alternatives were shown they were more likely to identify the correct word. There was a low correlation between the degree of concept attainment and either the child's general reading ability or the scores made on the sight recognition test. As many poor readers as good readers demonstrated high concept attainment. A high and significant correlation was noticed between general reading ability and scores on the sight recognition test. The children who were "good readers" were able to pronounce the words on the flash cards. But to score high on the cloze test, the child must be able to know what the sentence was about. Although the child could pronounce the words, if that child did not know what the sentence was about there was only a 33 percent probability of selecting the correct word if the three alternatives were given and there was a much lower probability

of being correct if the choices were not given. The amount of knowledge a child has concerning the subject matter of the material in which he or she is asked to perform reading tasks is directly related to the success manifested in those tasks.

Conclusions:

Certainly, the findings of this study seem predictable and self-evident. Children who know more do better. Other studies usually show similar results. Neie (1972) summarizes several studies by Taylor (1957), Rankin (1959), Gagne and Dick (1962), Bormuth (1962), and Jenkinson (1957) which show that performances by older children and adults on such instruments as the cloze test developed in a specific content area are correlated with general verbal and reading ability but much more highly correlated with comprehension within that area.

Many instuctional procedures do not take advantage of the variables which are found to be important to the learner's success. The teaching of reading in content areas is presently being strongly advocated. Unfortunately this procedure is sometimes interpreted as teaching content through reading rather than teaching reading through content. Although the teaching of content through reading (reading as a means to an end) is an important terminal objective, it may not be the best first step. When entering into a new content area, the child may first need to develop some knowledge structure by means other than reading. After some initial subsumers are developed, reading may gradually become more and more important as a primary information source.

The audio-tytorial (technologically mediated instruction) approach employing a mastery learning strategy can be an effective instructional

procedure to build these initial subsumers. Many children who are generally poor readers demonstrate high mastery of science concepts presented in this way and become highly motivated. Reading and other language experiences based on these knowledge structures may then be benificial for these children who are often very unsuccessful in the reading and language arts orientated class room.

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Appendix 1

Sentences used in the cloze test.

1a. Electric energy comes from the battery / wire / bulb _____.

1b. If the bulb is very bright the battery has much heat / electric / light _____ energy.

1c. Electric energy moves / changes / runs _____ to light energy.

2a. When a seed starts to grow the leaf / stem / root _____ grows first.

2b. Plants get air / water / energy _____ from the sun.

2c. The roots get food / water / energy _____ for the plant.